ASTRONOMY AND ASTROPHYSICS

A European Journal

Volume 304 1995

Published by Springer International on behalf of the Board of Directors

Astronomy and Astrophysics A European Journal

Board of Directors

Chairman:
A. Maeder (Switzerland)

Vice Chairman:
A. G. Hearn (The Netherlands)

D. Alloin (France)
R. Canal (Spain)
G. Contopoulos (Greece)
M. Crézé (France)
J. Einasto (Estonia)
R. Giacconi (ESO)
P. Harmanec (Czech Republic)
K. Mattila (Finland)
P. G. Mezger (Germany)
P. E. Nissen (Denmark)
C. Perola (Italy)
J. Pfleiderer (Austria)
Aa. Sandqvist (Sweden)
J. I. Smak (Poland)
P. Smeyers (Belgium)
B. Szeidl (Hungary)
R. Wielen (Germany)
J. Zverko (Slovak Republic)

Editors-in-Chief

J. Lequeux
Astronomy and Astrophysics
Editorial Office
Observatoire de Paris
61 avenue de l'Observatoire
F-75014 Paris
France

Tel. (33-1) 43290541
Fax (33-1) 43290557
e-mail: aanda@mesiob.obspm.fr (internet)
mesioa:: aanda (span)

M. Grewing
Astronomy and Astrophysics
Editorial Office
c/o Astronomisches Institut
Waldhäuserstrasse 64
D-72076 Tübingen
Germany

Tel. (49-7071) 294982
Telefax (49-7071) 293458
Telex (41) 7262714 ait d
e-mail:
Internet aaptue@ait.physik
uni-tuebingen.de
SPAN AITMVX::AAPTUE

Letter Editor

S. R. Pottasch
Kapteyn Astronomical Institute
P.O. Box 800
9700 AV Groningen
The Netherlands

Tel. (31-50) 3634093
Telex (44) 53572 stars nl
Telefax (31-50) 3636100

Editorial secretaries

Miss B. Perche
Mrs. M. Rougeot

Mr. W. M. Wettlaufer

Mrs. J. Zwegers-Morris

The exclusive copyright © for all languages and countries, including the right for photomechanical and any other reproduction, also in microform, ist vested in European Southern Observatory (ESO).
The use of registered names, trademarks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

Springer International 1995
Printed in Germany
Printing and bookbinding: Druckhaus Beltz, 69494 Hemsbach

Volume 304 1995

Contents

Letters to the Editor

Short-period waves in small-scale magnetic flux tubes on the Sun
Volkmer R., Kneer F., Bendlin C. L1

Laboratory rotational spectrum of CN in the 1 THz region
Klisch E., Klaus T., Belov S.P., Winnewisser G., Herbst E. L5

Escape of T Tauri stars from young stellar systems
Sterzik M.F., Durisen R.H. L9

A giant X-ray flare on the young star P 1724
Preibisch T., Neuhäuser R., Alcalá J.M. L13

Orbital motion of DF Tauri from speckle interferometry
Thiébaut E., Balega Y., Balega I., Belkine I., Bouvier J., Foy R., Blazit A., Bonneau D. L17

Observation of extended red emission (ERE) in the halo of M 82
Perrin J.-M., Darbon S., Sivan J.-P. L21

Cosmology

The distribution of the absorption-line redshifts of quasars: clustering of matter around quasars
Liu Y.-Z. 317

Extragalactic astronomy

The molecular front in galaxies. II. Galactic-scale gas phase transition of HI and H_2
Honma M., Sofue Y., Arimoto N. 1

Chemical abundances in clusters of galaxies
Matteucci F., Gibson B.K. 11

Centripetal acceleration within the subparsec nuclear maser disk of NGC 4258
Greenhill L.J., Henkel C., Becker R., Wilson T.L., Wouterloot J.G.A. 21

The radio and optical structure of three peculiar galaxies in A 1367
Gavazzi G., Contursi A., Carrasco L., Boselli A., Kennicutt R., Scodeggio M., Jaffe W. 325

The optical time delay in the double quasar Q 0957+561 A, B
Beskin G.M., Oknyanskij V.L. 341

Metallicities and carbon abundances of 40 field red supergiants in the Small Magellanic Cloud
Meliani M.T., Barbuy B., Richtler T. 347

A statistical study of the spectral index distribution of radiosources selected at 408 MHz
Grueff G., Vigotti M., Basso L. 357

"Vertical" horizontal branches and the age of the dwarf spheroidal galaxy Leo I
Caputo F., Castellani V., Degl'Innocenti S. 365

(RN) IRAS 23532+2513: a compact group including a Seyfert 1 and a starburst galaxy
Zou Z.-L., Xia X.-Y., Deng Z.-G., Wu H. 369

Galactic structure and dynamics (including a series on preliminary Hipparcos results)

Construction of the intermediate Hipparcos astrometric catalogue
Kovalevsky J., Lindegren L., Froeschlé M., van Leeuwen F., Perryman M.A.C., Falin J.L., Mignard F., Penston M.J., Petersen C., Bernacca P.L., Bucciarelli B., Donati F., Hering R., Høg E., Lattanzi M., van der Marel H., Schrijver H., Walter H.G. 34

A comparison of ground-based stellar positions and proper motions with provisional Hipparcos results
Lindegren L., Röser S., Schrijver H., Lattanzi M.G., van Leeuwen F., Perryman M.A.C., Bernacca P.L., Falin J.L., Froeschlé M., Kovalevsky J., Lenhardt H., Mignard F. 44

Zero-point and external errors of Hipparcos parallaxes
Arenou F., Lindegren L., Froeschlé M., Gómez A.E., Turon C., Perryman M.A.C., Wielen R. 52

Estimating the external accuracy of Hipparcos parallaxes by deconvolution
Lindegren L. 61

Parallaxes and the Hertzsprung–Russell diagram from the preliminary Hipparcos solution H30
Perryman M.A.C., Lindegren L., Kovalevsky J., Turon C., Høg E., Grenon M., Schrijver H., Bernacca P.L., Crézé M., Donati F., Evans D.W., Falin J.L., Froeschlé M., Gómez A., Grewing M., van Leeuwen F., van der Marel H., Mignard F., Murray C.A., Penston M.J., Petersen C., Le Poole R.S., Walter H. 69

Properties of the Hipparcos Input Catalogue
Turon C., Réquième Y., Grenon M., Gómez A., Morin D., Crifo F., Arenou F., Froeschlé M., Mignard F., Perryman M.A.C., Argue A.N., Crézé M., Dommanget J., Egret D., Jahreiß H., Mennessier M.O., Pham A., Evans D.W., van Leeuwen F., Lindegren L. 82

Astrometry of double stars with Hipparcos
Mignard F., Söderhjelm S., Bernstein H., Pannunzio R., Kovalevsky J., Froeschlé M., Falin J.L., Lindegren L., Martin C., Badiali M., Cardini D., Emanuele A., Spagna A., Bernacca P.L., Borriello L., Prezioso G. 94

The Hipparcos multiple stars: reduction methods and preliminary results
Gazengel F., Spagna A., Pannunzio R., Morbidelli R., Sarasso M. 105

Results on Tycho photometry
Großmann V., Bässgen G., Evans D.W., Grenon M., Grewing M., Halbwachs J.L., Høg E., Mauder H., Snijders M.A.J., Wagner K., Wicenec A. 110

Accurate registration of radio and optical images of SN 1987A
Reynolds J.E., Jauncey D.L., Staveley-Smith L., Tzioumis A.K., de Vegt C., Zacharias N., Perryman M.A.C., van Leeuwen F., King E.A., McCulloch P.M., Russell J.L., Johnston K.J., Hindsley R., Malin D.F., Argue A.N., Manchester R.N., Kesteven M.J., White G.L., Jones P.A. 116

Meridian circle reductions using preliminary Hipparcos positions
Réquième Y., Morrison L.V., Helmer L., Fabricius C., Lindegren L., Froeschlé M., van Leeuwen F., Mignard F., Perryman M.A.C., Turon C. 121

Comparison of ground-based proper motions from meridian observations and Astrographic Catalogue plates with Hipparcos proper motions
Jahreiß H., Réquième Y., Crifo F., Schwan H., Röser S., Bastian U., Froeschlé M., Lindegren L. 127

Schmidt plate astrometric reductions using preliminary Hipparcos and Tycho data
Robichon N., Turon C., Makarov V.V., Perryman M.A.C., Høg E., Froeschlé M., Evans D.W., Guibert J., Le Poole R.S., van Leeuwen F., Bastian U., Halbwachs J.L. 132

A study of systematic positional errors in the SPM plates
Platais I., Girard T.M., van Altena W.F., Ma W.Z., Lindegren L., Crifo F., Jahreiß H. 141

Tycho astrometry from half of the mission
Høg E., Bastian U., Halbwachs J.L., van Leeuwen F., Lindegren L., Makarov V.V., Pedersen H., Petersen C.S., Schwekendiek P., Wagner K., Wicenec A. 150

The Tycho star mapper background analysis
Wicenec A., van Leeuwen F. 160

Astrometry of minor planets with Hipparcos
Hestroffer D., Morando B., Mignard F., Bec-Borsenberger A. 168

Hipparcos minor planets: first step towards the link between the Hipparcos and the dynamical reference frames
Bec-Borsenberger A., Bange J.-F., Bougeard M.-L. 176

Preliminary link of the Hipparcos and VLBI reference frames
Lestrade J.-F., Jones D.L., Preston R.A., Phillips R.B., Titus M.A., Kovalevsky J., Lindegren L., Hering R., Froeschlé M., Falin J.-L., Mignard F., Jacobs C.S., Sovers O.J., Eubanks M., Gabuzda D. 182

Linking the Hipparcos Catalogue to the extragalactic reference system
Lindegren L., Kovalevsky J. 189

Invariant spectra in Hamiltonian systems
Contopoulos G., Grousousakou E., Voglis N. 374

Walraven *VBLUW* photometry in Basel halo fields. II. Metallicity distribution of F- and G-stars in the direction of SA 141 (South Galactic Pole)
Trefzger C.F., Pel J.W., Gabi S. 381

Stellar clusters and associations

Low mass stars in globular clusters. II. The mass function of M 15
De Marchi G., Paresce F. 202

Low-mass stars in globular clusters. III. The mass function of 47 Tucanae
De Marchi G., Paresce F. 211

Formation, structure and evolution of stars

The evolution of case B intermediate mass close binaries with Galactic and Magellanic Cloud chemical abundances
de Loore C., Vanbeveren D. 220

Recurrent supersoft X-ray sources
Kahabka P. 227

Toward a consistent model of the B0.5IVe + sdO binary φ Persei
Božić H., Harmanec P., Horn J., Koubský P., Scholz G., McDavid D., Hubert A.-M., Hubert H. 235

The all-sky pulsar search at 0.75–30 MeV by COMPTEL
Carramiñana A., Bennett K., Buccheri R., Busetta M., Connors A., Diehl R., Hermsen W., Kuiper L., Lichti G.G., Much R., Ryan J., Schönfelder V., Strong A. 258

Fundamental parameters of Wolf–Rayet stars. V. The nature of the WN/C star WR 8
Crowther P.A., Smith L.J., Willis A.J. 269

Pulsation and binarity in β Cephei stars. II. 16 Lacertae
Chapellier E., Le Contel J.M., Le Contel D., Sareyan J.P., Valtier J.C. 406

A pulsating star inside η Carinae. I. Light variations, 1992–1994
van Genderen A.M., Sterken C., de Groot M., Stahl O., Andersen J., Andersen M.I., Caldwell J.A.R., Casey B., Clement R., Corradi W.J.B., Cuypers J., Debehogne H., Garcia de Maria J.M., Jønch-Sørensen H., Vaz L.P.R., Stefl S., Suso Lopez J., Beele D., Eggenkamp I.M.M.G., Göcking K.-D., Jorissen A., de Koff S., Kuss C., Schoenmakers A.P., Vink J., Wälde E. 415

Calculation of stellar structure. IV. Results using a detailed energy generation subroutine
Rouse C.A. 431

On the theory of Type Ia supernova events
Bychkov V.V., Liberman M.A. 440

Stellar atmospheres

A fine analysis of calcium and iron lines in the spectrum of the chromospherically active G 8 dwarf ξ Bootis A
Ruck M.J., Smith G. 449

Diffuse matter in space (including H II regions and planetary nebulae)

Local Cloud structure from HST–GHRS
Lallement R., Ferlet R., Lagrange A.M., Lemoine M., Vidal-Madjar A. 461

The outflow structure of NGC 6537
Cuesta L., Phillips J.P., Mampaso A. 475

Kinematical study of ring nebulae around galactic Wolf–Rayet stars
Esteban C., Rosado M. 491

The helium parameters of the very local interstellar medium as derived from the distribution of He^+ pickup ions in the solar wind
Möbius E., Rucinski D., Hovestadt D., Klecker B. 505

Contribution of metal-bonded polycyclic aromatic hydrocarbons to the interstellar depletion
Klotz A., Marty P., Boissel P., Serra G., Chaudret B., Daudey J.P. 520

The spatio-kinematical structure of the compact planetary nebula Hu 2-1
Miranda L.F. 531

The Sun

Electron beam dynamics and hard X-ray bremsstrahlung polarization in a flaring loop with return current and converging magnetic field
Zharkova V.V., Brown J.C., Syniavskii D.V. 284

Formation of magnetic shear and an electric current system in an emerging flux region
Zhang H. 541

Profiles of the NaD and Mgb multiplets in the solar spectrum
van Breda I.G., Worrall G., Foster D.C. 551

Properties of cool flares with GOES class B5 to C2
Phillips K.J.H., Feldman U. 563

Electron acceleration to high energies at quasi-parallel shock waves in the solar corona
Mann G., Claßen H.-T. 576

The nature of solar flares associated with coronal mass ejection
Harrison R.A. 585

The solar system

Evidence on sizes and fragmentation of the nuclei of comet Shoemaker–Levy 9 from Hubble Space Telescope images
Sekanina Z. 296

The north polar hood in early autumn on Mars
Akabane T., Saito Y., Iwasaki K., Martin L.J. 595

Properties of interplanetary dust from infrared and optical observations. II. Brightness, polarization, temperature, albedo and their dependence on the elevation above the ecliptic
Renard J.B., Levasseur-Regourd A.C., Dumont R. 602

Spectra of energized pick-up ions upstream of the heliospheric termination shock. I. The role of Alfvénic turbulences
Chalov S.V., Fahr H.J., Izmodenov V. 609

Self-similar collapse in nebular disk and the Titius–Bode law
Li X.Q., Zhang H., Li Q.B. 617

The sensitivity of the size distribution to the grain dynamics: simulation of the dust flux measured by GIOTTO at P/Halley
Fulle M., Colangeli L., Mennella V., Rotundi A., Bussoletti E. 622

On the problem of the solar wind interaction with magnetized interstellar plasma
Baranov V.B., Zaitsev N.A. 631

Celestial mechanics and astrometry

Investigation of the FK5 system in the equatorial zone. Application to the instrumental system of the Second Quito astrolabe catalogue
Kolesnik Y.B. 638

Relativistic theory for clock syntonization and the realization of geocentric coordinate times
Wolf P., Petit G. 653

Physical and chemical processes

On the Keplerian circular motion of relativistic fluids
Lu J.-F., Yu K.N., Young E.C.M. 662

Measurements of the radiative lifetimes of TiO ($A^3\Phi$, $B^3\Pi$, $C^3\Delta$, $c^1\Phi$, $f^1\Delta$, $E^3\Pi$) states
Hedgecock I.M., Naulin C., Costes M. 667

Abstracts of articles which have been published in A&A Supplement Series 114, No. 1 678

CCD photometry of distant open clusters. II. NGC 6791
Kaluzny J., Rucinski S.M. 678

A radio continuum survey of Shapley–Ames galaxies at λ 2.8 cm. I. Atlas of radio data
Niklas S., Klein U., Braine J., Wielebinski R. 678

CCD imaging of ultra-steep-spectrum radio sources
Röttgering H.J.A., Miley G.K., Chambers K.C., Macchetto F. 678

Linear polarimetry of Ap stars. V. A general catalogue of measurements
Leroy J.L. 679

The Southern Coalsack. II. Analysis of the colour excess toward Selected Area 194
Franco G.A.P. 679

A study of the Chamaeleon star forming region from the ROSAT all-sky survey. I. X-ray observations and optical identifications
Alcalá J.M., Krautter J., Schmitt J.H.M.M., Covino E., Wichmann R., Mundt R. 679

Near infrared observations of southern young multiple systems
Chelli A., Cruz-Gonzalez I., Reipurth B. 680

Apsidal motion in the eclipsing binary FT Orionis
Wolf M., Šarounová L. 680

Observations of CO lines in southern spiral galaxies
Bajaja E., Wielebinski R., Reuter H.-P., Harnett J.I., Hummel E. 680

A period study of XZ Andromedae
Demircan O., Akalín A., Selam S., Derman E., Müyesseroğlu Z. 680

Stark widths and shifts of Ni II spectral lines
Dimitrijević M.S. 681

Einstein A-coefficients for vib-rotational transitions in CS
Chandra S., Kegel W.H., Le Roy R.J., Hertenstein T. 681

Achromatic lens systems for near-infrared instruments
Oliva E., Gennari S. 681

Autocorrelation central hole estimate from the moments of the total number of counts: Application to overlapped photopulses
Prieto P.M., Cagigal M.P. 681

The exact probability distribution governing the length of a random walk of equal steps
Webster A.S. 682

Abstracts of articles which have been published in A&A Supplement Series 114, No. 2 682

The centi-arcsecond structure of 16 low-frequency variable sources at 92 cm
Altschuler D.R., Gurvits L.I., Alef W., Dennison B., Graham D., Trotter A.S., Carson J.E. 682

New supernova remnant candidates in M 31
Magnier E.A., Prins S., van Paradijs J., Lewin W.H.G., Supper R., Hasinger G., Pietsch W., Trümper J. 682

Linear and non-linear limb-darkening coefficients for the photometric bands *RIJHK*
Claret A., Díaz-Cordovés J., Giménez A. 682

uvby photometry of the magnetic chemically peculiar stars HD 11187, HD 15144, 20 Eridani and HR 8933 and the early F star HD 14940
Adelman S.J., Boyce P.W. 683

Identifications of gigahertz peaked spectrum radio sources
de Vries W.H., Barthel P.D., Hes R. 683

Radial velocities: The Wilson–Evans–Batten catalogue *(Text in French)*
Duflot M., Figon P., Meyssonnier N. 683

NGC 7762: A forgotten moderate-age open cluster
Patat F., Carraro G. 683

Application of the spectral subtraction technique to the Ca II H & K and He lines in a sample of chromospherically active binaries
Montes D., De Castro E., Fernández-Figueroa M.J., Cornide M. 684

Dynamical behaviour of asteroids in a second-order commensurability
Fernández S., Roig F. 684

CCD photometric observations of blazars
Guibin J., Huiyu M., Xuefen C., Zhili L., Shengquan L., Guanghua L. 684

Multifrequency monitoring of RU Lupi. I. Observations
Giovannelli F., Vittone A.A., Rossi C., Errico L., Bisnovatyi-Kogan G.S., Kurt V.G., Lamzin S.A., Larionov M., Sheffer E.K., Sidorenkov V.N. 685

Coefficients for calculating the second-order moments of the polarization profiles of hydrogen lines
Casini R. 685

Atomic data from the IRON Project. XII. Electron excitation of forbidden transitions in the V-like ions Mn III, Fe IV, Co V and Ni VI
Berrington K.A., Pelan J.C. 685

Active mirrors warped using Zernike polynomials for correcting off-axis aberrations of fixed primary mirrors. I. Theory and elasticity design
Lemaître G.R., Wang M. 685

Active mirrors warped using Zernike polynomials for correcting off-axis aberrations of fixed primary mirrors. II. Optical testing and performance evaluation
Moretto G., Lemaître G.R., Bactivelane T., Wang M., Ferrari M., Mazzanti S., Di Biagio B., Borra E.F. 686

Empirical speckle transfer function measurements from partial eclipse observations of the Sun
de Boer C.R. 686

Orbital elements of multiple spectroscopic stars
Hadrava P. 686

An analytical method for computing optically thick line profiles
Cesaroni R. 686

Abstracts of articles which have been published in A&A Supplement Series 114, No. 3 687

Resolved atomic super-clouds in spiral galaxies
Braun R. 687

Hα emission from pre-main sequence stars
Fernández M., Ortiz E., Eiroa C., Miranda L.F. 687

A ROSAT XUV pointed phase source catalogue
Kreysing H.-C., Brunner H., Staubert R. 687

Photographic observations of visual double stars
Jasinta D.M.D., Raharto M., Soegiartini E. 688

UBVRI-CCD photometry of Cepheus OB3 association
Jordi C., Galadí-Enríquez D., Trullols E., Lahulla F. 688

P Cygni – spectral atlas with complete line identifications in the wavelength range from 4840 to 6760 Å
Markova N., Zamanov R. 688

Coordinated observations of the red dwarf flare star EV Lacertae in 1992
Abdul-Aziz H., Abranin E.P., Alekseev I.Y., Avgoloupis S., Bazelyan L.L., Beskin G.M., Brazhenko A.I., Chalenko N.N., Cutispoto G., Fuensalida J.J., Gershberg R.E., Kidger M.R., Leto G., Malkov Y.F., Mavridis L.N., Pagano I., Panferova I.P., Rodonò M., Seiradakis J.H., Sergeev S.G., Spencer R.E., Shakhovskaya N.I., Shakhovskoy D.N. 688

The UV properties of normal galaxies. III. Standard luminosity profiles and total magnitudes
Rifatto A., Longo G., Capaccioli M. 689

A deep *BVI* photometric study of the open cluster NGC 2453
Mallik D.C.V., Sagar R., Pati A.K. 689

Stellar models for a wide range of initial chemical compositions until helium burning. II. From $X = 0.63$ to $X = 0.80$, for $Z = 0.01$
Claret A., Giménez A. 689

Galactic HII regions at $l = 234°$
Russeil D., Georgelin Y.M., Georgelin Y.P., le Coarer E., Marcelin M. 689

New measurements of radial velocities in clusters of galaxies. IV.
Proust D., Mazure A., Vanderriest C., Sodré Jr. L., Capelato H.V. 690

CCD spectrophotometry of CVs. II. 3300–9150 Å atlas for 25 faint systems
Zwitter T., Munari U. 690

Instructions to authors A5

Astronomical nomenclature A12

Thesaurus of key words A15

Author-Title Index 1995 693

Subject Index 1995 755